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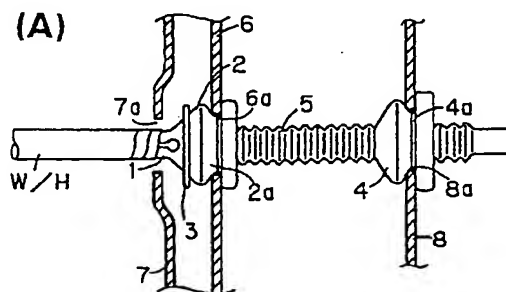
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(54) Grommet with water drouplet causing means

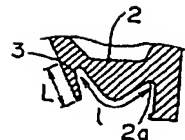
(57) To prevent water having entered through a fine clearance between a locking recess of a grommet and the edge of a through hole formed in a panel from entering a first or passenger compartment.

A jaw portion 3 or groove 30 is formed on or in the conical outer surface of a tapered tube portion 2 between an outer panel 6 and an inner panel 7. The jaw portion 3 or groove 30 blocks the water having entered through a clearance between a through hole 6a formed in the outer panel 6 and a locking recess 2a and trying to run toward a narrow tube portion 1 and causes it to fall down. Accordingly, the entered water falls down between the outer panel 6 and the inner panel 7 without entering the first or passenger compartment inside the inner panel 7.

FIG. 1



(B)



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Description

The present invention relates to a grommet to be mountable on a wiring harness to be arranged through a panel of an automotive vehicle and is particularly designed to improve the water preventing property thereof.

As a grommet of this type is known the one mountable on a wiring harness W/H to be arranged between a passenger compartment and a door of an automotive vehicle as shown in FIG. 4.

As shown in FIG. 5, a grommet 100 includes an integral assembly of a narrow tube portion 40, a tapered tube portion 41 which is continuous with one end of the narrow tube portion 40 and the diameter of which increases so as to be conically configured, a locking recess 41a formed in the outer surface of a larger side of the tapered tube portion 41, a corrugated tube portion 42 continuous with the tapered tube portion 40, a tapered tube portion 43 continuous with the corrugated tube portion 42, and a locking recess 43a formed in the outer surface of the tapered tube portion 43. The tube portions 40, 41 and the locking recess 41a are to be arranged at a passenger compartment side, whereas the tapered tube portions 43 and the locking recess 43a are to be arranged at a door side.

The wiring harness W/H is passed through a hollow portion of the grommet 100. The locking recess 41a is lockingly engaged with a through hole 44a formed in an outer panel 44 and the narrow tube portion 40 is passed through a through hole 45a formed in an inner panel 45. The locking recess 43a is lockingly engaged with a through hole 46a formed in a door panel 46. In this way, the wiring harness W/H can be arranged between the passenger compartment and the door. The entrance of water through the through holes is prevented by the grommet 100.

However, there are some cases where the entrance of water cannot be securely prevented by the grommet 100. In other words, water may enter through a fine clearance between the locking recesses 41a, 43a of the grommet 100 and the through holes 44a, 46a.

In this case, the water having entered the door can be discharged outside through water discharge holes 47 formed in the bottom of the interior of the door D shown in FIG. 4. However, as shown in FIG. 6, water 48 enter the passenger compartment inside the inner panel 45 along the surfaces of the tapered tube portion 41 and the narrow tube portion 40 of the grommet 100 and the surface of the wiring harness W/H. Thus, there is a possibility that such water 48 may cause a short circuit of electrodes connected with a connector 49 at the leading end of the wiring harness W/H, thereby adversely affecting an electric circuit.

In view of the above problems, an object of the present invention is to provide a grommet which can prevent water from entering a passenger compartment through a fine clearance between locking recesses of

the grommet and the edges of through holes.

This object is solved according to the invention by a grommet according to claim 1. Preferred embodiments of the invention are subject of the dependent claims.

According to the invention, there is provided a grommet comprising an integral or unitary assembly of a narrow tube portion, a tapered tube portion which is continuous with one end of the narrow tube portion and the diameter of which increases, and a locking recess provided in or on the outer surface of a larger side of the tapered tube portion, the grommet being mounted or mountable in a through hole formed in a first panel of a vehicle body with a wiring harness passed through the hollow portion thereof, wherein a water drip causing means is provided on the tapered outer surface of the tapered tube portion and a portion of the grommet from the drip causing means to the narrow tube portion is passed or passable through a through hole formed in a second panel of the vehicle body so as to cause water having entered through a grommet mounting portion of the first panel to fall down between the first and second panels by the water drip causing means.

As is clear from the above description, according to the inventive grommet, the water running over the surface of the tapered tube portion between the first and second panels of the vehicle body is blocked by the water drip causing means formed on or in the tapered tube portion, and is caused to fall down from the water drip causing means. Accordingly, the entrance of water toward the passenger compartment any farther than the water drip causing means can be securely prevented, thereby eliminating a likelihood that the enter water adversely affects an electric circuit.

According to a preferred embodiment of the invention, the water drip causing means comprises a jaw or collar or flange portion projecting from the tapered, preferably conical outer surface of the tapered tube portion.

Preferably, there is provided a grommet comprising an integral assembly of a narrow tube portion, a tapered tube portion which is continuous with one end of the narrow tube portion and the diameter of which increases so as to be conically configured, and a locking recess provided in the outer surface of a larger side of the tapered tube portion, the grommet being mounted in a through hole formed in a first panel of a vehicle body with a wiring harness passed through the hollow portion thereof, wherein a jaw portion projects from the conical outer surface of the tapered tube portion and a portion of the grommet from the jaw portion to the narrow tube portion is passed through a through hole formed in a second panel of the vehicle body so as to cause water having entered through a grommet mounting portion of the first panel to fall down between the first and second panels by the jaw portion.

With the above construction, the water having entered through the grommet mounting portion of the first panel and trying to run over the surface from the tapered tube portion to the narrow tube portion can be

blocked by the jaw portion projecting from the conical outer surface of the tapered tube portion and caused to fall down after running down the jaw portion. Accordingly, the water having entered through the grommet mounting portion of the first panel falls down between the first panel and the second panel through which the narrow tube portion is inserted without running toward the narrow tube portion.

Preferably, the projecting length of the jaw portion is set smaller than a length between the base end position of the jaw portion and the locking recess. With such setting, the jaw portion is not going to be caught between the through hole of the first panel and the locking recess of the tapered tube portion when the grommet is mounted on the first panel. In other words, there is no likelihood that the jaw portion is caught between the through hole of the first panel of the vehicle body and the locking recess of the tapered tube portion when the grommet is mounted on the first panel. As a result, the grommet can be more easily mounted.

Further preferably, the jaw portion is arranged substantially vertically (or at an angle different from 0° or 180°) to the longitudinal direction of the tapered tube portion or the jaw portion is arranged or arrangeable at an angle different from 0° or 180° to the horizontal, preferably substantially vertically, when the grommet is mounted on the first and second panels.

Accordingly, a very effective water entrance or stopping function of the jaw portion can be provided.

According to a further preferred embodiment, the water drip causing means comprises a groove being formed in the tapered, preferably conical outer surface of the tapered tube portion.

Preferably, there is provided a grommet comprising an integral assembly of a narrow tube portion, a tapered tube portion which is continuous with one end of the narrow tube portion and the diameter of which increases so as to be conically configured, and a locking recess provided in the outer surface of a larger side of the tapered tube portion, the grommet being mounted in a through hole formed in a first panel of a vehicle body with a wiring harness passed through the hollow portion thereof, wherein a groove is formed in the conical outer surface of the tapered tube portion and a portion of the grommet from the groove to the narrow tube portion is passed through a through hole formed in a second panel of the vehicle body so as to cause water having entered through a grommet mounting portion of the first panel to fall down between the first and second panels by the groove.

Even when the groove is provided instead of or additionally to the jaw portion as above, the entered water can be caused to fall down from the groove after being temporarily deposited therein.

Preferably, the grommet is to be mounted or mountable on a wiring harness which is to be arranged by being passed through through holes formed in an inner panel as the second panel and an outer panel as the

first panel and through a through hole formed in a door panel, and the water drip causing means, preferably the jaw portion and/or the groove is to be located between the inner panel and the outer panel.

With the above grommet, the water having entered through the grommet mounting portion of the outer panel falls down between the inner and outer panels without entering the inside of the inner panel, i.e. of the passenger compartment.

The grommet may preferably further comprise a corrugated tube portion substantially continuously provided at the leading end of the tapered tube portion, a second tapered tube portion substantially continuously provided at the leading end of the corrugated tube portion, and a locking recess formed in the outer surface of the second tapered tube so as to be preferably engaged with the through hole of the door panel.

The grommet as above can be suitably used to be mounted on a wiring harness to be arranged between a passenger compartment and a door of an automotive vehicle.

Further preferably, the diameter of the tapered tube portion increases so as to be substantially conically configured.

Most preferably, the drip causing means, preferably the jaw portion is circumferentially provided on the tapered tube portion.

These and other objects, features and advantages of the present invention will become more apparent upon a reading of the following detailed description and accompanying drawings in which:

FIGS. 1A and 1B show a first embodiment of the invention, wherein FIG. 1A is a schematic diagram of a grommet and FIG. 1B is an enlarged view of an essential portion of a jaw portion,

FIG. 2 is a schematic cross section of the grommet according to the first embodiment mounted through outer and inner panels,

FIGS. 3A and 3B show a second embodiment of the invention, wherein FIG. 3A is a schematic diagram of a grommet and FIG. 3B is an enlarged view of an essential portion of a groove,

FIG. 4 is a schematic perspective view of a prior art grommet mounted on an automotive vehicle,

FIG. 5 is a schematic diagram of the prior art grommet, and

FIG. 6 is a schematic section of the prior art grommet mounted through outer and inner panels.

Hereafter, the invention is described with reference to the drawings.

A grommet according to a first embodiment shown in FIG. 1 is to be mountable on a wiring harness to be arranged between two parts, preferably a passenger compartment and a door of an automotive vehicle.

At a first side, preferably a passenger compartment side, the grommet has an integral assembly of a narrow

tube portion 1, a tapered tube portion 2 which is continuous with one end of the narrow tube portion 1 and the diameter of which increases so as to be preferably substantially conically configured, and a locking recess 2a formed in the outer surface of a larger side of the tapered tube portion 2. A jaw portion 3 projects from the conical outer surface of the tapered tube portion 2 while being inclined toward the locking recess 2a. A projecting length L of the jaw portion 3 (i.e. a length L in radial direction of the projection of the jaw portion 3 as measured from the base end at the tapered surface of the tapered tube portion 2) is shorter or smaller than a length l between the base end position of the jaw portion 3 and the locking recess 2a, preferably as measured along the outer side of the tapered tube portion 2.

At a second side, preferably a door side, the grommet has an integral or unitary assembly of a tapered tube portion 4 and a locking recess 4a formed in the outer surface of the tapered tube portion 4.

An expandable corrugated tube portion 5 is substantially continuous with the tapered tube portion 2 at the first or passenger compartment side and the tapered tube portion 4 at the second or door side.

A wiring harness W/H is inserted into a hollow portion of the grommet from the narrow tube portion 1 at the first or passenger compartment side to the tapered tube portion 4 at the second or door side, and is fixed by taping or the like fixing means at the leading end of the narrow tube portion 1.

The locking recess 2a of the first or passenger compartment side is lockingly engaged with a through hole 6a formed in an outer panel 6 which serves as a first panel of a vehicle body, and the narrow tube portion 1 is inserted into a through hole 7a formed in an inner panel 7 which serves as a second panel of the vehicle body. As a result, the jaw portion 3 substantially projects between the outer panel 6 and the inner panel 7 while being inclined toward the outer panel 6, in particular upon insertion into the through hole 6a. When the locking recess 2a is lockingly engaged with the through hole 6a of the outer panel 6, the narrow tube portion 1 is pulled toward the inside of the outer panel 6. If the projecting length L of the jaw portion 3 is too long, the jaw portion 3 may be caught between the edge of the through hole 6a and the locking recess 2a. However, since the projecting length L is smaller than the length l between the base end position of the jaw portion 3 and the locking recess 2a, the above undesirable event can be prevented and the grommet can be easily mounted.

Further, the locking recess 4a of the second or door side is lockingly engaged with a through hole 8a formed in a door panel 8.

The wiring harness W/H is arranged between the first part or passenger compartment and the second part or door by mounting the grommet having the wiring harness W/H passed through on the panels 6, 7, 8 as described above.

In the case that water 9 splashes on the tapered

tube portion 2 outside the outer panel 6 and enters the inside of the outer panel 6 through a fine clearance between the edge of the through hole 6a in the outer panel 6 and the locking recess 2a of the tapered tube portion 2 as shown in FIG. 2, the entered water 9 tries to run over the surface of the tapered tube portion 2 toward the narrow tube portion 1. However, this water is blocked by the jaw portion 3, since the jaw portion 3 is preferably arranged at an angle different from 0° or 180° from the horizontal, preferably substantially normal thereto (i.e. substantially vertically arranged) in its mounted state, and runs down to the leading end of the jaw portion 3 and falls or drips down between the outer panel 6 and the inner panel 7.

Falling down between the outer panel 6 and the inner panel 7, the entered water 9 does not run as far as the wiring harness W/H at the leading end of the narrow tube portion 1, thereby securely preventing the entrance of water to the inside of the inner panel 7, i.e. to the first or passenger compartment. Thus, there is no likelihood that a connector 10 experiences a short circuit caused by the entered water, thereby adversely affecting an electric circuit.

Water having entered the inside of the second part or door through the clearance between the locking recess 4a of the tapered tube portion 4 of the second or door side and the through hole 8a formed in the door panel 8 is discharged outside through water discharge holes (not shown) provided at the bottom of the interior of the second part or door as in the prior art.

FIGS. 3A and 3B show a second embodiment, in which a groove 30 is formed instead of the jaw portion 3. Since the other construction is similar or identical, no description is given thereon by identifying it by the similar or same reference numerals.

Even in the case that the groove 30 is formed as in the second embodiment, water having entered through the outer panel 6 is deposited in the groove 30 after running over the outer surface of the tapered tube portion 2 and falls down from the groove 30. Therefore, the entrance of water through the inner panel 7 can be prevented.

Although the wiring harness is arranged between the first or passenger compartment and the second part or door in the foregoing embodiments, the inventive grommet may also be applied to a wiring harness to be arranged in an other portion of an automotive vehicle so as to cause the entered water to fall down by the jaw portion or groove 30 provided at the tapered tube portion 2 of the grommet, thereby securely preventing the entrance of water to the inside of the first or passenger compartment.

As is clear from the above description, according to the inventive grommet, the water running over the surface of the tapered tube portion between the first and second panels of the vehicle body is blocked by the jaw portion and/or groove (acting as water drip causing means) formed on or in the tapered tube portion, and is

caused to fall down from the jaw portion or groove. Accordingly, the entrance of water toward the first or passenger compartment any farther than the jaw portion or groove can be securely prevented, thereby eliminating a likelihood that the enter water adversely affects an electric circuit.

LIST OF REFERENCE NUMERALS

1	Narrow Tube Portion	
2	Tapered Tube Portion	
2a	Locking Recess	
3	Jaw Portion	
4	Tapered Tube Portion (Second Tapered Tube Portion)	
5	Corrugated Tube Portion	
6	Outer Panel (First Panel)	
6a	Through Hole	
7	Inner Panel (Second Panel)	
7a	Through Hole	
8	Door Panel	
8a	Through Hole	
30	Groove	
L	Projecting Length of the Jaw Portion 3	
l	Length between the Base End Position of the Jaw Portion 3 and the Locking Recess 2a	
W/H	Wiring Harness	

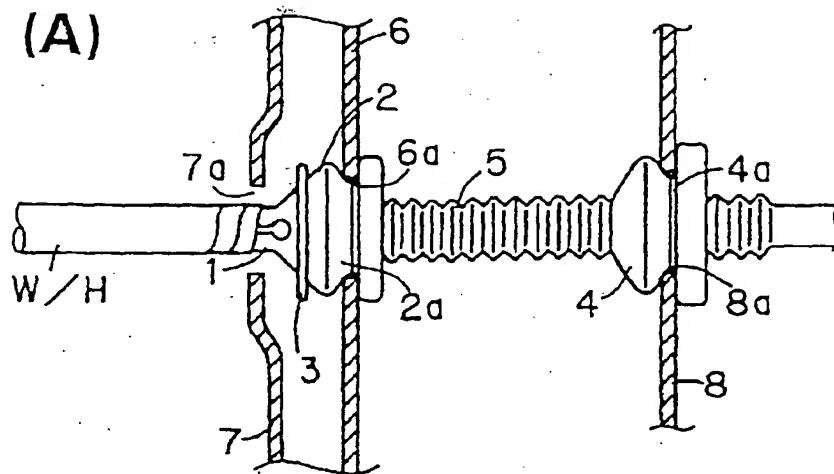
Claims

1. A grommet comprising an integral or unitary assembly of a narrow tube portion (1), a tapered tube portion (2) which is continuous with one end of the narrow tube portion (1) and the diameter of which increases, and a locking recess (2a) provided in or on the outer surface of a larger side of the tapered tube portion (2), the grommet being mounted or mountable in a through hole (6a) formed in a first panel (6) of a vehicle body with a wiring harness (W/H) passed through the hollow portion thereof, wherein a water drip causing means (3; 30) is provided on the tapered outer surface of the tapered tube portion (2) and a portion of the grommet from the drip causing means (3; 30) to the narrow tube portion (1) is passed or passable through a through hole (7a) formed in a second panel (7) of the vehicle body so as to cause water (9) having entered through a grommet mounting portion of the first panel (6) to fall down between the first and second panels (6, 7) by the water drip causing means (3; 30).
2. A grommet according to claim 1, wherein the water drip causing means (3; 30) comprises a jaw portion (3) projecting from the tapered, preferably conical outer surface of the tapered tube portion (2).
3. A grommet according to claim 2, wherein the pro-

jecting length (L) of the jaw portion (3) is smaller than a length (l) between the base end position of the jaw portion (3) and the locking recess (2a).

4. A grommet according to claim 2 or 3, wherein the jaw portion (3) is arranged substantially vertically to the longitudinal direction of the tapered tube portion (2).
5. A grommet according to one or more of the preceding claims, wherein the water drip causing means (3; 30) comprises a groove (30) being formed in the tapered, preferably conical outer surface of the tapered tube portion (2).
6. A grommet according to one or more of the preceding claims, wherein the grommet is to be mounted on a wiring harness (W/H) which is to be arranged by being passed through through holes (7a, 6a) formed in an inner panel (7) as the second panel (7) and an outer panel (6) as the first panel (6) and through a through hole (8a) formed in a door panel (8), and wherein the water drip causing means (3; 30), preferably the jaw portion and/or the groove is to be located between the inner panel (7) and the outer panel (6).
7. A grommet according to one or more of the preceding claims, further comprising a corrugated tube portion (5) substantially continuously provided at the leading end of the tapered tube portion (2), a second tapered tube portion (4) substantially continuously provided at the leading end of the corrugated tube portion (5), and a locking recess (4a) formed in the outer surface of the second tapered tube (4) so as to be preferably engaged or engageable with the through hole (8a) of the door panel (8).
8. A grommet according to one or more of the preceding claims, wherein the diameter of the tapered tube portion (2) increases so as to be substantially conically configured.
9. A grommet according to one or more of the preceding claims, wherein the drip causing means (3; 30), preferably the jaw portion (3) is circumferentially provided on the tapered tube portion (2).

FIG. 1



(B)

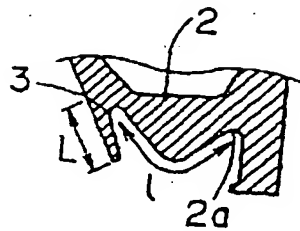


FIG. 2

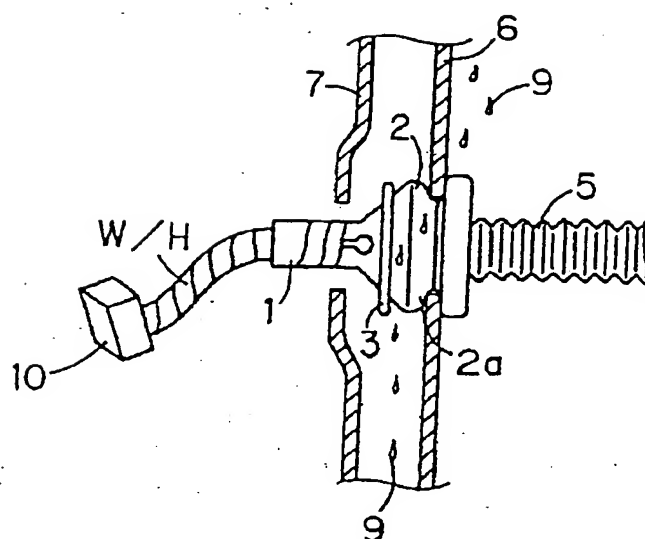
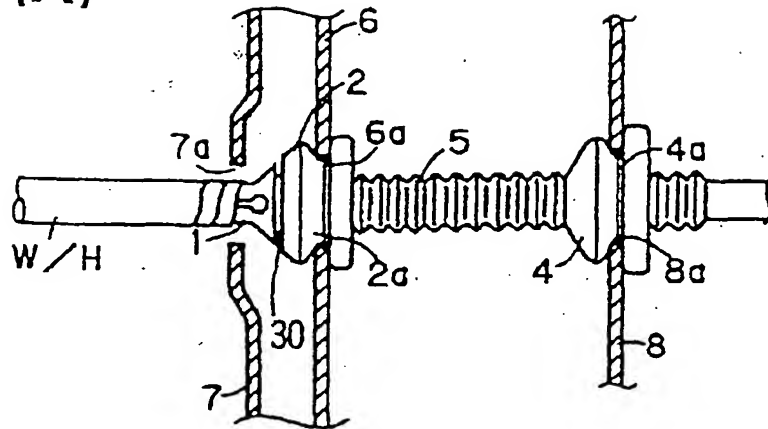


FIG. 3

(A)



(B)

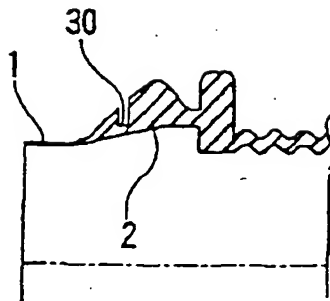


FIG. 4
PRIOR ART

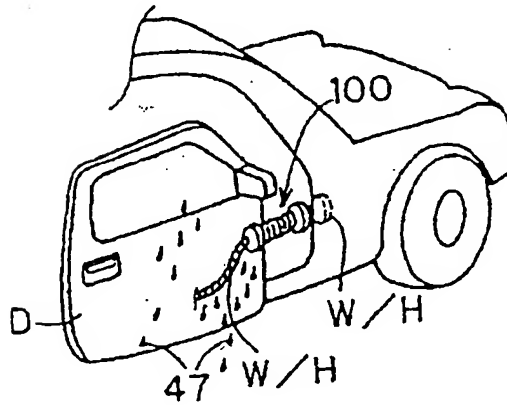


FIG. 5
PRIOR ART

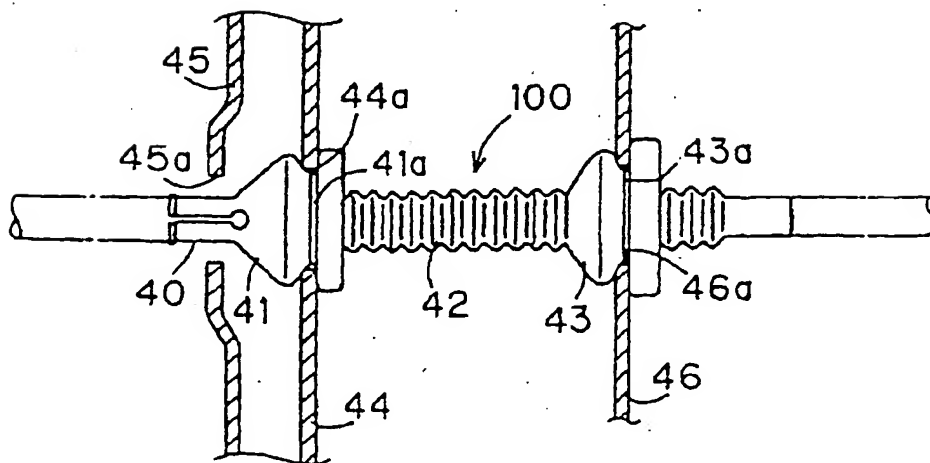
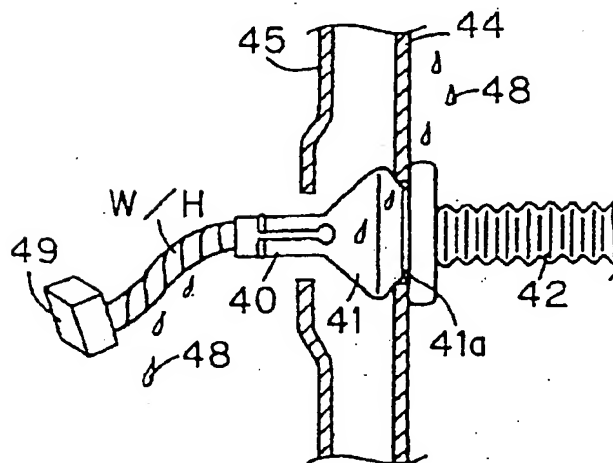


FIG. 6
PRIOR ART





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 98 11 0203

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	DE 18 06 569 U (DAIMLER-BENZ AG) 25 February 1960 * the whole document *	1-9	F16L5/10 H01B17/58 H02G3/22 B60R16/02
X	DE 42 13 727 C (MERCEDES-BENZ AG) 22 April 1993 * figures 2,4 *	1-9	
A	FR 2 730 785 A (PEUGEOT) 23 August 1996 * figure 1 *	1,6,7	
A	EP 0 603 741 A (OPEL ADAM AG) 29 June 1994 * figure 1 *	1,6,7	
A	US 4 010 986 A (OTTO HEINZ) 8 March 1977 * column 2, line 57 - column 3, line 22 *	1,5	
A	GB 2 286 978 A (BUSHBOARD PARKER LTD) 6 September 1995 * page 3, line 27 - page 3, line 30; figure 1 *	1,5	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			F16L H01B H02G B60R
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 11 September 1998	Examiner Donnelly, C
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons A : technological background O : non-written disclosure P : intermediate document & : member of the same patent family, corresponding document	
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